

## WE CLAIM

1. A VHF generator for delivering rf power to a plasma, comprising,
  - a) a variable rf signal generator including a power amplifier connected to a directional coupler;
  - b) the directional coupler having one output connected to a matching network wherein power is delivered to plasma in a processing chamber;
  - c) at least one output of the directional coupler disposed to sample a forward power signal of the rf signal generator and at least one output of the directional coupler disposed to sample a reflected power signal of the rf signal generator;
  - d) each of the sampled forward and reflected signals are connected to mixers for mixing with an intermediate frequency of an oscillator;
  - e) the mixed forward and reflected signals are passed through low pass filters;
  - f) the filtered forward and reflected signals are connected to amplifiers and detectors; and
  - g) the detected forward and reflected signals are fed back to a power control circuit wherein the power deliver to the plasma is monitored without interference from spurious frequency signals generated by the plasma.
2. A VHF generator for delivering rf power to a plasma as recited in claim 1 wherein forward and reflected bandpass filters are connected between the output of the directional coupler and the mixers for removing harmonics and spurious low frequency signals.
3. A VHF generator for delivering rf power to a plasma as recited in claim 2 wherein the detectors are diode detectors.
4. A VHF generator for delivering rf power to a plasma as recited in claim 2 wherein the detectors are RMS detectors.
5. A VHF generator for delivering rf power to a plasma, comprising,
  - a) a rf signal generator including a power amplifier connected to a directional coupler;

- b) the directional coupler having one output connected to a matching network wherein power is delivered to plasma in a processing chamber;
- 5 c) at least one output of the directional coupler disposed to sample a forward power signal of the rf signal generator and at least one output of the directional coupler disposed to sample a reflected power signal of the rf signal generator;
- d) each of the sampled forward and reflected signals are connected to forward and reflected signal mixers;
- 10 e) a first oscillator connected to a second mixer for mixing a sampled output of the variable rf signal generator with a first intermediate frequency;
- f) the output of the second mixer is connected to a first band pass filter and then connected to a third mixer for mixing with a second intermediate frequency of a second oscillator;
- 15 g) the output of the third mixer is connected to second band pass filter and connected the forward and reflected signal mixers;
- h) the mixed forward and reflected signals are passed through low pass filters;
- 20 i) the filtered forward and reflected signals are connected to amplifiers and detectors; and
- j) the detected forward and reflected signals are fed back to a power control circuit wherein the power deliver to the plasma is monitored without interference from spurious frequency signals generated by the plasma.
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6. A VHF generator for delivering rf power to a plasma as recited in claim 5 wherein forward and reflected bandpass filters are connected between the output of the directional coupler and the forward and reflected mixers for removing harmonics and spurious low frequency signals.
- 30 7. A VHF generator for delivering rf power to a plasma as recited in claim 6 wherein the detectors are diode detectors.
8. A VHF generator for delivering rf power to a plasma as recited in claim 6 wherein the detectors are RMS detectors.